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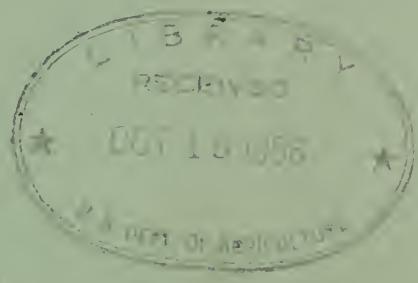
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STATION'S QUARTERLY REPORT

3d Quarter

Calendar Year 1951



Northeastern
Forest Experiment Station
Upper Darby, Pa.



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Northeastern Forest Experiment Station

QUARTERLY REPORT

3rd Quarter
Calendar Year 1951

GENERAL

by Ted Larson

CHIEF WATTS VISITS NORTHEAST

Chief Forester Lyle F. Watts came to the Northeast on September 23 for a 9-day inspection visit to the northern New England States. During his trip the Chief Forester visited the White and Green Mountain national forests, several of our experimental forests, and farm forestry projects. He met state forestry officials, pulp and paper people, and educators as well as Forest Service personnel for discussions of forestry problems and projects.

Flying up from Washington, the Chief was met at Bangor, Maine, by Director Marquis and Regional Forester Swingler, who accompanied him on his tour. His first stop was at the Penobscot Experimental Forest, where he looked over the work under way. He met Maine Forest Commissioner Nutting for informal discussions, and at an evening session met with a group representing the pulp and paper industry, the Maine Forest Service, and the University of Maine forestry department.

The following day (Tuesday) he inspected farm forestry projects in the vicinity of Dixfield, Maine. Wednesday he visited the White Mountain National Forest, where he saw the Wild River timber sale and recreational area. On Thursday he visited the experimental forest at Bartlett and some more farm forestry projects; and on Friday visited the Massabesic Experimental Forest at Alfred.

Mr. Watts spent the weekend as the guest of Mr. and Mrs. R. M. Evans (former regional forester) at the camp they were occupying at Lake Winne-pesaukee. From there he went to Rutland, Vermont, to meet Green Mountain Supervisor Wheeler and his staff. He inspected the Green Mountain National Forest and visited a sugar bush.

At the end of his tour, Mr. Marquis and Mr. Swingler drove Chief Watts to Albany, where he emplaned for the State Forester meeting in Charleston, S. Carolina. The Chief, Mr. Marquis noted, seemed to enjoy being out in the woods, talking forestry, and seeing the projects under way. He was especially interested in farm forestry projects and in problems of insects and disease.

PERSONNEL SHIFTS

A number of personnel shifts took place during the quarter. Those who left the Station, besides former director Harper, include Jim Rettie, former chief of the Station's Division of Forest Economics, who transferred to the Washington office. At present he is spending most of his time as the Forest Service's representative to the President's Materials Policy Commission. Ellis Williams also transferred to the Washington office, to work in the Division of Forest Economics.

Foremost among the new faces, of course, is Ralph W. Marquis, who succeeded Les Harper as director. Norman B. Griswold came from the Southern Station (Birmingham Research Center) to become chief of the forest survey inventory section. Spence Potter, who had been on detail in Washington, has returned to the Upper Darby office, where he is compiling a manual of forest economics information for the Northeast.

RESEARCH PROGRAM REAPPRAISAL

The Station was called on during the quarter to take part in gathering information for a nation-wide reappraisal of the forest research effort. The report, requested by the House Appropriations Committee, called for information about Forest Service research on forest management, forest influences, and forest economics in relation to non-federal research.

As in the previous reappraisal, made in 1949, information was gathered on nonfederal expenditures for research (1) in cooperation with the Forest Service, (2) correlated with the Forest Service program, and (3) independent of the Forest Service. The survey of the Northeast indicated that nonfederal expenditures for forest management and forest economics research are continuing at the high level reported in 1949.

Personnel at all the Station's work centers were called upon to help gather this information, and the Upper Darby staff devoted considerable time to the project. Herb Storey is now in Washington on a detail connected with the report on the survey.

ADMINISTRATIVE SERVICES

by Robert Bain

APPROPRIATIONS

For the second straight year, we did not receive our appropriations until almost the first of October. While the limitation on travel which was included in last year's Appropriation Bill has been dropped, Congress has placed a definite limitation on personnel for the current fiscal year. We have a monetary limitation as to what we can spend for salaries in the Director's Office and another limitation on the over-all salaries for the entire Station. In addition, the Jensen Amendment was passed which permits us to fill only one vacancy out of four.

At present we are in the midst of trying to determine how these ceilings will affect us. We hope that all record keeping on this can be handled in the Upper Darby office and if it can be worked out, field units will not be affected.

LEAVE

In conjunction with the Appropriation Bill, Congress reduced the annual leave earnings from 26 days to 20 days. This was made retroactive to July 1 and since final advice was not received until October, we have had a real problem in adjusting each employee's leave record. Some of our temporary employees actually had minus balances in their leave accumulation after this adjustment was made. While normally temporary employees are not permitted to have an advance on leave, we were able to make a special case in this instance and have allowed future accumulations to offset this credit balance.

Since, of course, we are still operating on a 26 pay period basis and the leave earnings are not divisible by 26, the resulting fractions have been bothersome. The actual earnings per pay period amount to 6 hours and 9 minutes and in order to eliminate the fractional accounting, each employee will be credited with 6 hours per pay period and the balance picked up at the end of the year.

There is still a strong possibility that the graduated leave plan may be adopted before the end of the year. This provides for different leave earnings based on years of service, and as we understand it, if the

law is passed it, too, will be retroactive to July 1, 1951. This means that if the Bill is passed, we must again recompute all our leave earnings.

PAY RAISE

As we go to print, we have had nothing definite on the proposed pay raise. The Senate and the House each have separate Bills and the question is now subject to conference between the two committees. It seems fairly certain that there will be a pay increase this fiscal year and there is a good chance it will be retroactive to July 1.

PERSONNEL

While we have always considered our girls to be tops, it seems that others have the same idea too. Dorotha Perkins spent one week at the Central States Experiment Station assisting in training a new library clerk. Dorothy Atras is currently on detail at Denver as payroll and accounting clerk on the new Insect Control Project.

We are glad to welcome Roy Hines who returned from a tour of duty with Uncle Sam. This is Roy's second trip since he is a veteran of World War II.

Barney Duffy reported October 1 in the position vacated by Roland Kendall. Barney has had considerable experience on the Allegheny National Forest, the Division of Fiscal Control and as Principal Clerk on the Cumberland National Forest.

Harry Price has been on detail from the Delaware Basin Research Center to help us out on payrolls. Harry had the unenviable job of making all those leave computations.

SAFETY

We are heading for our worst safety record, at least insofar as automotive accidents are concerned. To date we have had 7 automotive accidents with one-third of the year to go. Last year we had 2 such accidents.

To date, we have had four personal injury cases with 1 lost-time accident which is a big improvement over last year, but again we still have 4 months to go.

INSPECTION

Bain made inspections during the quarter at the following Experimental Forests:

Kane Experimental Forest	July 23 - 24
Penobscot Experimental Forest	August 13 - 15
Massabesic Exp. Forest	August 16 - 17

EDITORIAL AFFAIRS

by Ted Larson

PUBLICATIONS DURING QUARTER

Ferguson, Roland H.

1951. WHO LIKES SQUARE ROOTS?
Jour. Forestry 49: 653.

Jensen, Victor S., and Wilson, Robert W., Jr.

1951. MOWING OF NORTHERN HARDWOOD REPRODUCTION NOT PROFITABLE.
Northeast. Forest Expt. Sta., Northeast. Research
Note 3. 4 pp.

Little, S., and Somes, H. A.

1951. AGE, ORIGIN, AND CROWN INJURIES AFFECT GROWTH OF
SOUTH JERSEY PINES. Northeast. Forest Expt. Sta.,
Northeast. Res. Note 8. 4 pp. Upper Darby.

McLintock, Thomas F.

1951. BUDWORM DAMAGE IN CANADA: SOME OBSERVATIONS ON
MORTALITY. Northeast. Forest Expt. Sta., Northeast.
Research Note 4: 1-2.

-
1951. STUMP DIAMETER RELATED TO D.B.H. FOR SPRUCE-FIR REGION.
Northeast. Forest Expt. Sta., Northeast. Research
Note 4: 2-4.

McGuire, John R.

1951. WHITE PINE RESEARCH IN MAINE.
Maine Forester. Univ. Maine, Maine Forester 1951:52-57.

Rettie, James C.

1951. FORESTS AND YOU.
Pa. Forests 36:82.

Schreiner, Ernst J.

1951. BREEDING POPLARS FOR DISEASE RESISTANCE.
Brooklyn Bot. Gard., Plants & Gardens 7: 140-143, illus.

Storey, Herbert C.

1951. A MILESTONE IN CONSERVATION...A NATIONAL WATER RESOURCES
POLICY. Pa. Forests 36: 76-77, 80.

Westveld, Marinus.
1951. VEGETATION MAPPING AS A GUIDE TO BETTER SILVICULTURE.
Ecology 32: 508-517, illus.

Wright, Jonathan W.
1951. TREE-BREEDING TECHNIQUES: SOME EFFECTS OF CONTINUOUS
BAGGING. Northeast. Forest Expt. Sta., Northeast.
Research Note 5. 4 pp.

NOW BEING PRINTED AT STATION

Bethlahmy, Nedavia.
DISTANT EARTHQUAKES AFFECT LOCAL GROUND-WATER LEVELS.
Northeast. Forest Expt. Sta. Research Note.

Little, S., and Somes H. A.
HYBRID PINES TESTED SHOW NO EXCEPTIONAL VIGOR.
Northeast. Forest Expt. Sta. Research Note.

McLintock, Thomas F.
STOCKING IN SPRUCE-FIR STANDS.
Northeast. Forest Expt. Sta. Research Note.

Paul, Benson H., and Drow, John T.
SOME PHYSICAL AND MECHANICAL PROPERTIES OF AMERICAN BEECH.
Beech Util. Series.

Rettie, J. C., and Williams, Ellis.
SURVEY REPORT, MERRIMACK RIVER WATERSHED.

Scheffer, Theodore C., and Zabel, Robert A.
STORAGE OF BEECH LOGS AND BOLTS IN THE NORTHEAST.
Beech Util. Series.

Wangaard, F. F.
THE STEAM-BENDING OF BEECH.
Beech Util. Series.

FOREST ECONOMICS

by Marie Jackson

FOREST SURVEY

Inventory

Field work in the Adirondacks region of New York was completed this period and the crews have moved back to their field headquarters at Bath and Kingston, New York. With the completion of field activities in Maryland, our crew there has been transferred to Massachusetts and a Survey office is now established at the Harvard Forest, Petersham, Massachusetts.

New aerial photography for Massachusetts, Connecticut, and Rhode Island is in the process of being flown and we hope to have photos available for our use in the very near future. Until photography for these three states is made available, the Massachusetts crew is assisting with the New York survey by concentrating their activities in the Catskill area.

With the completion of Maryland we have now covered four complete states by field inventory. Field work in New York is rapidly drawing to a conclusion and should be completed during the present fiscal year.

Commodity Drain

Work was initiated to secure data on commodity production in New York State. Mail questionnaires were sent to all pulp mills and to all sawmills producing over a million board feet annually, but not contacted by the Census Bureau for 1950 production data.

Field work in New York State, necessary to sample production of fuelwood and fence posts and production of sawmills producing less than a million board feet annually, was 90 percent complete by the end of this quarter.

Some work was started on office computation of woods utilization factors in West Virginia.

Reports

A first draft of "Forest Statistics for Vermont" has been sent to State Forester Merrill for review.

Survey releases were compiled for Western Maryland, Pennsylvania Unit 7, and New York Districts 3, 7, and 12. Narrative reports for these releases have been written. They are all awaiting adjustment of volume for log grade 4 material.

All tables have been compiled for Maryland Unit 2.

Mr. Erling Mykland of Oslo, Norway, who came to the Station in July to study Forest Survey techniques, has recently been working with the Compilation Section. He has prepared all of the worksheets for New York District No. 4, and has completed most of the tables for this survey release.

Compilation of tables of forest statistics for West Virginia has begun. The report should be complete before the end of next quarter.

OTHER ACTIVITIES IN ECONOMICS

In response to a request of the Flood Control Section, the Compilation Section has been preparing an estimate of forest area for those counties in New York in which the forest survey has been completed. This data is needed for NENYIAC.

An investigation is being made of the effectiveness of market bulletins. Initial work on this study was begun in September in New Hampshire and Rhode Island.

Mike Ostrander has continued his study of the application of log grades and has recently come up with a log grade stick for hardwood scalers.

Spence Potter, detailed from the Division of Flood Control Surveys has begun preparation of a handbook of forest-economic information for the Northeast.

Solon Barraclough and Ernie Gould of the Harvard Forest have prepared an analysis of the early operation of New Hampshire's new forest tax law. This is soon to be published as a station paper.

Personnel

There were a number of personnel changes during the period. James C. Rettie, Chief of the Division, left in August to accept an assignment in the Washington office. At present he is spending most of his time

working as Forest Service representative to the President's Materials Policy Commission--an assignment that has taken up a great deal of his time and effort during the last several months.

John R. McGuire, who has been heading the Resource Analysis Section, is Acting Chief of the Division.

Ellis T. Williams was transferred to the Washington office in August to work in the Division of Forest Economics.

Norman B. Griswold, from the Southern Station's Birmingham Research Center, has taken over Harry Camp's duties as Chief of the Forest Survey Inventory Section.

Solon L. Barraclough is now stationed at Harvard Forest, Petersham, Mass., where he will work on his report on the economics of forest management.

Fred Hampf has been transferred from the field to Upper Darby to work with Wayne Banks on timber drain.

Northeastern Forest Experiment Station

Upper Darby, Pa.

QUARTERLY REPORT ON

FOREST INFLUENCES AND FLOOD CONTROL SURVEYS

October 1, 1951



FLOOD CONTROL SURVEYS

by Norman R. Tripp

For the past three months activity has centered around two main projects--completion of pending survey reports and work on the New England-New York Resources Survey.

STATUS OF FLOOD CONTROL SURVEY REPORTS

Connecticut River.--In Washington for final approval.

Merrimack River.--Review draft completed.

Salt River.--Tentative draft completed and sent to FIARBC agencies for preliminary review.

Allegheny, Upper Susquehanna, and Monongahela Rivers.--No further progress.

NE-NYTAC--RESOURCES SURVEY

Work which will contribute to the Resources Survey has been going on steadily along several lines.

Land Use

In collaboration with the SCS, data on basic land acreages, condition and use are being compiled on the basis of SCS Problem Areas. With the Hydrology Section, sample subwatersheds have been chosen to represent typical conditions in each problem area. Complete data on soil-cover complexes, condition and use are being assembled for each subwatershed. These will be used to compare the effect of present and future conditions on runoff and sedimentation.

Hydrology

With information on vegetative cover and soils supplied by the Land Use Section, studies are being carried forward to measure the hydrologic effects of present and future conditions within the subwatersheds. These findings will later be expanded to determine the hydrologic effect of the land treatment program for the entire problem area.

Damage Appraisal

Crews have been in the field for several months gathering data necessary for establishing stage-damage relationships for the New England and New York rivers. Todate the work has been completed in Maine and western New York. The crews will continue working in southern New England as long as weather permits.

In collaboration with the SCS, the P.M.A., and the Corps of Engineers and various state agencies, a list of known local flood damage centers has been compiled. This list contains damage points which vary in size from the major New England cities with enormous damages to small areas where a few houses or a few acres of farm land have been damaged. So far we have 766 points on the list and more coming. Parties composed of both FS-SCS and Corps of Engineers people are now visiting each damage point to decide whether or not some form of a local remedial program is possible and, if so, advising further study by the agency or agencies concerned. Thus we will eventually have a complete file on every known flood damage point in the New England-New York area with specific recommendations for each site.

Cooperation with Department of Agriculture Field Committee

Flood Control people have attended several meetings of the Department of Agriculture Field Committee for the New England-New York area. At these meetings we have explained the work of the flood control organization; have worked on methods of correlating and coordinating flood control surveys with the work of the committee; and have assisted in the formulation of work plans and schedules for the general Resources Survey.

As a part of its work on the NE-NYIAC, the Department of Agriculture, at the request of the Corps of Engineers, has undertaken a study to determine methods and procedures for analyzing the impact of reservoir building on agricultural communities. Earl Rogers took part in the preliminary investigation of two sites in New Hampshire and is now preparing a report to the Department on methods and costs for appraising the effects of inundation on forest lands and industries.

Other Committee Assignments

Don Whelan has been appointed Department of Agriculture representative on the Hydrology Sub-committee of the NE-NYIAC. Among other

things he has been working on a method for estimating flood frequencies which would be acceptable to all agencies represented on the committee. They have been successful and the method has been adopted for NE-NYIAC use.

Norman Tripp has been appointed Department of Agriculture representative to the Flood Control Work and Study Group of the NE-NYIAC. To date accomplishments have been mainly in the form of attendance at meetings.

Project Work Inventory

As a part of its contribution to the NE-NYIAC study, Region 7 is undertaking a project work inventory for all forest land in the survey area. A Flood Control representative has been appointed to a joint Experiment Station-Region committee which is devising methods and procedures for making the study and which will later supervise conduct of the necessary field work.

DELAWARE BASIN RESEARCH CENTER

by Nedavia Bethlahmy

During the third quarter of the current year we laid the basis for securing additional information on both scrub oak and high forest areas. At the same time, we continued compiling, organizing and analyzing previously obtained data.

General Watershed Analysis

During this quarter we tested the general reliability of the methods used at Dilldown in evaluating the separate items of the water budget. The test was accomplished by computing daily figures for each item for a period of three months of the 1950 summer, and then computing a trial balance for each month on the basis of the equation: Inflow = Outflow + Storage. The test indicated that the methods are reasonably reliable, but that additional refinements are still in order. Our plans are to determine additional refinements for the following items: riparian water losses and soil moisture losses.

Riparian water loss.--Preliminary analysis by Reigner indicated that riparian water losses may be correlated with saturation deficit and wind movement. The plan is to determine a regression equation that will correlate these losses with the above two factors. Since our wind data are incomplete (week-end measurements are lacking), Reigner devised a satisfactory recording wind gage by installing an electro-magnet in a spare recording rain gage; the magnet is activated by impulses from the anemometer, and in turn activates the pen arm of the rain gage.

Soil water loss.--During the past several months, the resident hydrographer (Dixon Miller) has been taking daily soil moisture readings (with the Colman meter) at all sites in the watershed. These readings are now being compiled and organized in conjunction with all other attending factors. Analysis of this data will result in a regression equation that will correlate soil moisture losses with other factors.

Vegetation Survey

The general plan for the Dilldown Watershed is to convert this scrub oak area to high forest (by planting and intense fire protection) after a period of calibration. Our knowledge of the present vegetative cover is incomplete. Detailed information is needed in order to gage the changes that will occur in the future. Accordingly, Reigner wrote a work plan for a detailed vegetative survey. The plan has been approved. Reigner and O'Brien are now locating the ends of the survey lines.

Stemflow Installations

During the previous quarter, last year's stemflow installations were reactivated at Dilldown. This quarter, new installations were put in the Pocono Forest (a high forest consisting of both conifers and

mixed hardwoods). The stemflow data will supplement the information that is already being collected on interception. The work on stem flow is accomplished on an area rather than single tree basis. In this way, the data derived from each representative area may be applied to the total area occupied in the watershed by the particular type. Two representative areas were selected: northern hardwoods (beech, red maple and cherry of all ages and sizes) and conifer (principally hemlock and rhododendron with associated red maple and birch). Collars were installed on each stem in each of the representative areas.

Soil Reconnaissance

During the quarter, Mr. Walter Lyford, Chief of the Soil Survey Division in the northeast, visited the area. Mr. Lyford gave us the proper soil series nomenclature that is to be used in both the Dilldown and Pocono areas. Descriptions of the soil series in the Dilldown area have not appeared in print. The soils at Dilldown are: Dilldown (named after the Dilldown Watershed), Hazleton and Borie. In the Pocono area the soils are in the Catskill Catena, and consist of the following series (in order of increasingly poor drainage): Catskill, Mardin, Fremont and Volusia.

Collection of soil monoliths.--While at the station, Mr. Lyford showed us an excellent method of collecting soil micro-monoliths. Such a collection is admirable for purposes of demonstration, as well as for correlation with other soils. Briefly, the method consists of sampling and then mounting properly each horizon of the soil. The soil is sampled in a small metal sampler (1" x 1.5" and 1.2" deep) that has within it a closely fitting block of wood whose thickness is slightly less than the depth of the sampler. A small piece of thin cardboard is placed on the wood block, and is covered with glue. The entire assembly is then pressed into the soil horizon being sampled. The blade of a knife is then thrust behind the soil sample, and the sample removed. The soil is then pressed into the sampler, and smoothed over to fit the shape of the sampler. By pushing forward the block of wood, the soil sample is removed from the sampler. The cardboard (onto which the soil is now glued) is mounted on the left hand side of a thick piece of cardboard (3.5" x 10"). The right hand side of the cardboard is reserved for a written description of the soil.

Soil Moisture Units

During the last quarter we found that the roots of scrub oak plants grow deeper than the location of our lowest placed soil moisture unit. Accordingly, we started sampling the deeper soil horizons (down to four feet) for calibration with the Colman moisture units. Because of the extreme rockiness of the soils at Dilldown, it was impossible to use beer cans for sampling. The method followed this time consisted of pressing the units into the soil, and then removing the sample with a volume weight sampler. We recommend this method for all soils that do not lend themselves to easy sampling. Incidentally, the lower depths of

most of our soils were not sampled at all, because not enough rock-free soil was found to enable us to insert the soil moisture units.

Thermistor coefficients.--Before undertaking the new soil calibrations, the factory-designated thermistor coefficients of all units were checked. We found that all the coefficients were incorrect, and that they differed significantly from the coefficients determined in the laboratory. Our opinion is that the factory determined the coefficient of each thermistor before enclosing it in its monel sheath, and that the spot welding in seven places around the sheath changed the value of the coefficient. In general, a change of ± 0.045 from the true thermistor coefficient reflects a change of ± 1 on the Colman meter moisture scale; but a similar change on the temperature scale results from a change of only ± 0.018 from the true thermistor coefficient. Since the scale of the Colman meter cannot be read more accurately than one unit, it is evident that the limits of accuracy of the thermistor coefficients must be within ± 0.05 for moisture measurements and ± 0.02 for temperature measurements. Because of the fact that permanent installations of Colman units can yield valuable information on temperature, we recommend that a limit of error of ± 0.02 be used in checking the accuracy of the thermistor coefficients. Thus, if the factory and laboratory coefficients vary by 0.02 or less, use the factory coefficient; but if the coefficients vary by more than 0.02, use the laboratory coefficients.

Personnel

During the quarter Donald Close terminated his employment at the Center, and is now employed by the Weather Bureau in Washington.

We now have the help of Jerry O'Brien who works at the Center three days of the week and studies the other two days at Lehigh University.

Harry Price, our statistical clerk, has been on an extended temporary detail in Upper Darby. As a result, the compilation of hydrologic and climatic data for both Dilldown and Pocono has been delayed.

Herb Storey is presently on temporary detail in Washington. From past experience we suspect that this detail will also be extended over a longer period than originally anticipated.

Miscellaneous

Eric Holmsgaard, a research forester from Denmark, visited the Center. Holmsgaard's research pertains to the correlation of tree ring analyses with climatic data.

Approximately 80 foresters of the Allegheny Section of the SAF visited the Center, and were conducted over the Dilldown Watershed, where they viewed all the projects now in progress.

Storey and Bethlahmy attended the Northeastern Forest Soils

Conference at State College, Pa. The meeting was held in conjunction with the meeting of the Soil Science Society of America.

Recommended reading: Rudolf Geiger, *The Climate Near the Ground*. (Harvard University Press, 1950).

MOUNTAIN STATE RESEARCH CENTER

by George R. Trimble, Jr.

Fernow Experimental Forest

Watersheds.--The first water quality samples from our forested watersheds were taken in July. They showed (in parts per million) a turbidity of 4.0, suspended solids 15-17, dissolved solids 34-36; pH was 7.2. Water temperatures were relatively uniform for all five watersheds ranging from $54\frac{1}{2}^{\circ}$ F. to $55\frac{1}{2}^{\circ}$ F. At the time of sampling heads at the weirs ranged from .082 feet to .152 feet. Discharge was all ground-water flow on a slowly dropping hydrograph.

After a dry July followed by an even drier August, the discharge from our weirs is very low. The flow characteristics of several of the watersheds relative to each other have changed with the great decrease in discharge. The stream from our largest watershed, whose discharge is normally second from the highest, has ceased flowing altogether. On the other hand, the stream from the smallest watershed, which usually has the lowest discharge, still flows. All watersheds have received approximately the same amount of precipitation.

During the period August 20-23, we made a number of volumetric checks on our 120° V-notch weirs to determine the applicability of the experimental discharge formula $Q = 4.43 H^{2.449}$. Flows were low from all five watersheds. There was so little discharge from number four that no check could be made. The results of the checks are tabulated below:

Watershed number	Check no.	Head determined by hook gage (feet)	Discharge determined by formula (c.f.s.)	Actual discharge (c.f.s.)	Actual discharge divided by formula discharge
1	1	.015	.0001	.0001	1.00
	2	.015	.0001	.0001	1.00
	3	.026	.0006	.0006	1.00
	4	.027	.0006	.0006	1.00
	5	.028	.0007	.0007	1.00
2	1	.024	.0005	.0007	1.40
	2	.025	.0005	.0007	1.40
	3	.025	.0005	.0007	1.40
	4	.025	.0005	.0007	1.40
	5	.025	.0005	.0008	1.60
3	1	.038	.0015	.0018	1.20
	2	.039	.0016	.0019	1.19
	3	.039	.0016	.0019	1.19
	4	.039	.0016	.0020	1.25
	5	.041	.0018	.0021	1.17
4	Flow too low to check				
5	1	.035	.0012	.0016	1.33
	2	.036	.0013	.0017	1.31
	3	.037	.0014	.0019	1.36
	4	.037	.0014	.0017	1.21
	5	.040	.0017	.0020	1.18

A levelling check determined that the reference bar correction factors for the hook gage readings were accurate. It appears that, for these very low flows at least, we need discharge valves for some of our watersheds other than those given by the formula. As soon as higher flows are available for checking, new rating curves will be drawn.

Soil loss from main skid roads.--Examination of the measurements taken of soil loss (or gain) from three logging roads indicates that sample profile measurements should be close together to give an accurate estimate of soil disturbance. Though this conclusion is based on limited data, the measurements indicate that to accurately determine soil loss during skidding requires more intensive sampling than the one chain intervals we used.

FOREST UTILIZATION SERVICE
QUARTERLY REPORT, JULY - SEPTEMBER 1951

DEFENSE

Forest Utilization Service's contribution to defense during the quarter was concerned primarily with the equipment-manpower survey being made for the National Production Authority. Mr. Simmons was on detail to the Washington Office for the entire period. This Office prepared summary narrative reports for the several sub-divisions of the forest industries. It also reviewed the reports of Mr. Tabbutt of the Regional Office on rapid tax amortization applications. So far he has made 32 reports.

TIMBER CONVERSION

Log Grades and Timber Quality

The latter part of July Mr. Lockard gave a three day course in log grading at the Zaleski State Forest in Ohio. Attendance included representatives of the Central States Station, State Forestry Organization, Ohio State University, National Forest Administration, and a large sawmill. In the latter part of September he gave a refresher course to the staff of the Allegheny National Forest where the log grade system is being given a thorough tryout as a means of improving appraisals.

Previous reports have mentioned the quality survey of Vermont sawtimber carried out by the Vermont Forest Service, under a plan developed by this Office, using district foresters trained in log grading. This survey was completed and the data were used to round out the Forest Survey reports for that State. Altogether 1,555 trees were graded, log by log. Results showed that 77 percent of the total volume of all species of hardwood fell into the factory class (by grades this broke down as follows: F1, 25%; F2, 23%; F3, 29%), 11 percent fell into the structural class (this class was not graded), and 12 percent was classed as local use material.

Mr. Ostrander of this Office cooperated with the Vermont Forest Service in studies of milling graded logs at four different mills in Vermont. Preliminary analysis of the data from these studies showed reasonable conformance with Forest Products Laboratory yields and also indicated possible important operating cost differentials between logs of different grades and classes.

Mr. Lockard attended a conference on log and tree grades held at the Forest Products Laboratory in August. Region 7 was represented by C. L. Kinney of the Allegheny National Forest and W. C. Curnutt of the Monongahela. Among other things, this conference recommended the adoption of Forest Products Laboratory factory log grades in their present form.

German Gang Saw

The Wackerbarth Box Company of Granville, Massachusetts has installed an Esterer round log gang saw. This machine is operating satisfactorily, according to their operator, on crooked white pine, hemlock, and white birch logs. 4/4 lumber is cut off the outside of the log and 8/4 from the center. Forest Utilization Service plans to study this machine in detail later.

Wood Chipping

Dr. Jerome S. Rogers of the Eastern Research Laboratory has been cooperating with the Michigan School of Mines in a project designed to separate the bark from the wood from chips made from unbarked slabs. Chips were prepared on a Murray hog in Michigan and shipped to the Laboratory. About 55 percent of the material ended up as a wood fraction, with about 2 percent bark. Bark was not separated from the remaining 45 percent successfully. Mr. Walter Koepp of the Michigan School of Mines and Mr. Lockard held a conference with Mr. Rogers and other Laboratory personnel, at which the Laboratory agreed to make further tests to see if greater efficiency could be obtained. Attention was called to the work of Tennessee Valley Authority in this field which resulted in what promises to be an economical separation process. Attention was also directed to work at the University of Florida where wood with not over 5 percent bark is obtained by the process they had developed there.

Movies

Started in the last quarter a movie designed to show small operators and farmers easier ways of logging was completed and is almost ready for release. Mr. Simmons helped edit the final narration. Mr. Fenton of this Station acted as technical advisor.

Boltwood on the Allegheny National Forest

Last year the Allegheny National Forest made a sale which included a considerable volume of sub-log size material, principally cherry. Forest Utilization Service had a chance to make a quick inspection of the operation recently. The trees cut as a thinning operation, are hauled long length to a special small mill. These long pieces are, in the main, quite crooked. The sale was made on board foot basis, International rule, with crook and sweep no defect. At the mill entrance an electric chain saw is used to cut straight, short random length bolts from the logs. These pieces are then cut into one inch dimension stock with a set-up which included a Ricker bolter, a straight line rip saw, a cut-off saw, and an automatic length sorter. Widths are random and lengths range from 10-inches to 36-inches, in 3-inch multiples. From the sorter bins, the green dimension is stickered on lift truck pallets and bound with steel strapping. The loaded pallets are put in the yard for preliminary drying and then kiln dried in cross circulation kilns built for machine loading. The operator measures his timber by using Doyle rule with measurement which includes one bark. It is estimated that he recovers 90 percent of the resulting Doyle scale in dimension stock.

Beech Series

Three papers in the beech series are now on multilith plates and will be run off early in the next quarter.

SEASONING

Air Seasoning Experiment

Early in the quarter, Messrs. Peck and Jensen from the Forest Products Laboratory, assisted by FUS, spent several weeks in Philadelphia setting up an elaborate air seasoning experiment at J. Henry Disston & Sons, Inc. Four piles of green heart beech lumber, each containing five lift truck units, were set up at test piles. A number of whole sample boards were placed in each pile; these were carefully weighed and inspected for defects. In some of these boards permanent electrodes from which to take moisture determinations with an electrical meter were placed. At a number of these stations, a thermocouple and EMC block with permanent electrodes installed. The leads from all these points were run into a building where daily readings of temperature and moisture content were made. The piles were built according to standard Company practice and were placed flat. Lumber in two of the piles was steamed, a procedure used by the Company to color sapwood. Two piles, one unsteamed and one steamed, were placed on low foundations and crowded on adjacent dummy piles. Two similar

piles were placed on a foundation about 18-inches off the ground and adjacent dummy piles were placed about a foot from them. In addition, a so called bench mark station was established to measure the rate of drying under free drying conditions. An EMC block and thermocouple were installed there, with temperature and moisture determination made by instruments. Also sample boards both unsteamed and steamed, were hung under cover. These were weighed periodically. It is planned that a new set of sample boards will be put up each month and that a new set of test piles every three months will be installed. As lumber becomes air dried, it will be inspected for defects, put through the Company's kilns, re-inspected for defects and then fabricated. The quality of the seasoning, will be rated by the outturn of products. This experiment should yield not only information which will help cut down the Company's losses, but which will fill needed gaps in some of the fundamental aspects of air drying especially as related to machine handling.

Dry Kiln Clinic

From September 10 to 15th, Messrs. Rasmussen, McMillen, and Youngs did a remarkable job in putting on a six day seasoning clinic at the University of Massachusetts, Amherst, Massachusetts. There were fourteen paid enrollees and two auditors. All of the New England States except Rhode Island, as well as New York and Pennsylvania were represented. This clinic was arranged by Professor J. Harry Rich of the Forestry Department and FUS

Dry Kiln Clubs

About 15 members of the Northeastern Dry Kiln Club attended the last session of the Amherst Seasoning Clinic. Arrangements have been made for a further meeting of this Club, in conjunction with the New England Club, at the Forest Products Research Society meeting at Cambridge in November. A fall meeting of the Keystone Club at York Pennsylvania has been scheduled for October 26. These clubs have been a fine means of getting information on the new Laboratory schedules into general use. Many companies are now using these schedules. One (The Eagle Square Manufacturing Company of Stockbridge, Vermont) reports, for example, that it has been using the kiln schedules since about the middle of May with very good success and that their use has increased kiln output considerably.

Dry Kiln Experiments

In its current seasoning program, the Laboratory proposes to work on black cherry. Arrangements have been made to secure logs from the Pocono Experimental Forest and the Allegheny National Forest for these experiments. Arrangements were also made to ship to Yale University, beech logs from the Allegheny National Forest as material for a study on seasoning characteristics of this species.

WOOD CHEMISTRY

Forest Utilization Service contacted a large dairy company which indicated an interest in wood molasses. The company has a number of large milk processing plants. At certain seasons of the year these operate only to a limited extent. The company is investigating processes which might be used to utilize this idle capacity. This means that both raw material and product must be of such nature that they can be stored if necessary.

Charcoal

On September 14, Dr. Locke attended a conference on charcoal production and uses held at Durham, New Hampshire in cooperation with the University of New Hampshire by the Northeastern Wood Utilization Council. Papers were presented on all phases of charcoal production and use; these will be published as a Council bulletin.

GENERAL

Service

A large producer of firearms requested help on general wood working problems. Mr. Lockard and Mr. McMillen of the Laboratory visited this firm. Some of their problems lay in the machining field and they were put in touch with a machining manufacturer who has worked in this field. Other problems lay in the drying field, and indications are that a great deal of research is necessary before they can be resolved. Negotiations are underway leading to the development of possible cooperative agreement with the Forest Products Laboratory. In connection with firearms, Mr. McMillen also visited the Springfield Armory and discussed drying problems there.....A lumber dealer in the Philadelphia area had a complaint about the warping of drawer fronts manufactured from heavy maple kiln-dried by him. A discussion of schedules and procedures with his operator indicated that difficulty was unquestionably due to failure to condition. Forest Products Laboratory publication No. R1791 contained instructions adequate to meet the operator's needs in adjusting his procedure.....Several wood lot owners were given information on market outlets for pulpwood and fuelwood.....A visit was paid the Franklin Institute to inspect a collection of 600 wood samples representing both foreign and domestic species. This exhibit is now collecting dust and the Institute is interested in either disposing of it, or making it a "live" exhibit.

Forest Products Research Society

The fall meeting of the Northeastern Section of the Forest Products Research Society will be held at Massachusetts Institute of Technology, Cambridge, Massachusetts, November 1 and 2. The theme of the meeting is, "What Research Can Do For Industry."

Fenton Transferred

Mr. R. H. Fenton who for several years has been working out of Storrs, Connecticut, under the Norris-Doxey Farm Forestry Research Funds, has been transferred to the staff of the Beltsville Experimental Forest. This transfer closes out this project which has been intimately concerned with the products field. Studies made here have delved in to such things as use of wood for fuel, charcoal production, diffusion preservation methods, and wood chipping.

D. Simmons

FOREST GENETICS

by Jonathan W. Wright

In August Schreiner and Wright made a 5 year remeasurement of the original hybrid poplar plantation in Maine. This plantation, now 24 and 25 years old, was originally put in on a 6 x 6 spacing, and has never been thinned. Consequently growth has slowed down during the past 5 years. Most of the selected trees which are being tested in clonal plantings at various work centers are now 60 feet or more tall and 12 inches or more d.b.h. The largest is 80 feet tall and 16 inches d.b.h. Mortality during the past 5 years has been light for these selected trees. Most of which had previously been regarded as outstanding still remain disease free.

The seedlings resulting from last spring's poplar breeding were put into the Beltsville nursery during the summer.

During this quarter Schreiner started a study of the relation between soil characteristics and poplar growth, sampling soils from good and poor portions of the plantings at Beltsville, Hopkins, and the original Maine plantings; and in good wild stands of poplar in Vermont and New York. So far his results indicate that texture and drainage are the most important factors governing poplar growth. He plans on pursuing these poplar-soil studies in Europe this coming year.

The fruits from last spring's control pollination experiments were harvested in September. Judging from the cone crop, the best results were obtained from the spruces. The few crosses made in the ashes also gave satisfactory sets of hybrid seed. Crosses on eastern white pine gave almost no cones although such crosses had been very successful the previous year. Several other pine crosses have yielded very well, however. The results from the maples were very disappointing.

All control-pollinated stock in the nursery was measured in September. The stock is 1, 2 and 3 years old. These measurements give a preliminary estimate of the true hybridity and of possible hybrid vigor of the seedlings. Some of the most interesting progenies are:

Acer platanoides x cappadocicum, A. negundo x henryi.
1 and 2 years old. Easily recognizable as hybrids.
Hybrid vigor.

Pinus densiflora x sylvestris.
1 year old. Smaller than true P. densiflora, but significantly more precocious in getting secondary needles.

P. densiflora x nigra, P. d. x thunbergii
Probable hybrid vigor in 1 year old trees.

P. strobus x griffithii, P. s. x monticola
1 and 2 year old seedlings are almost certainly
hybrids but are difficult to recognize as such.

This summer we have tried to replace hand weeding and cultivating in the experimental nursery with mulching (with 3-4 thicknesses of newspaper and up to an inch of packed grass clippings). The mulching was very laborious on conifer seedlings an inch or two tall. It was satisfactory on larger conifer and hardwood stock, keeping up soil moisture and almost eliminating weeds during the summer. Thickness of mulch proved important, as thinly mulched beds required an excessive amount of hand weeding.

ALLEGHENY PLATEAU RESEARCH CENTER

Quarterly Report, July-September 1951

by A. F. Hough

SILVICULTURE--HARVEST CUTTINGS--CUTTING PRACTICE LEVEL PLOTS

Plans prepared during the preceding quarter were carried out this field season through the establishment of a series of fair cutting practice level plots on the Kane Experimental Forest. These illustrate the initial cut in a previously unmanaged 60-year-old second growth stand on a good site. Each treatment, or level of cutting, was applied to a 5 acre block fronting on a forest development road near Dahoga, Pa.

The four treatments to be illustrated are: (1) High-order practice: A tree selection partial cutting removing low vigor or low quality trees on a 5 year cycle, and leaving a well-stocked stand of the better black cherry for future growth into high quality products. (2) Good practice: A tree selection partial cutting similar to the above but on a 15-year cutting cycle, removing a greater proportion of the volume in the initial cut, with the objective of producing both cordwood and good quality but generally smaller sized sawlogs. (3) Fair practice: Removal of cordwood and sawlog products 10 inches dbh and larger except for about 10 designated crop trees or standards left per acre as the basis for future sawlog cuts on a 20 to 25 year cutting cycle. The objective of fair practice for the integrated production of both cordwood and a limited cut of sawlogs is to keep the land reasonably productive and occupied by desirable commercial species. (4) Poor practice: Liquidation of all present volume and values by removal of all merchantable sawtimber followed by cutting all merchantable cordwood for pulp or chemical use to a two or three inch diameter limit. This is the usual type of cutting to be found on thousands of acres within the Allegheny Plateau region. Future cuttings for bulk cordwood may be made at intervals of 35-40 years but full replacement of the volume and stand structure present before cutting can not be expected before 50-60 years.

An appraisal of timber values and sale of this material under Regulation S-25 has been completed with the assistance of the Allegheny National Forest and cutting is now in progress by a local timber operator. Data on the cost of logging are being kept by the operator and will be made available to the Station. Complete data on the volume and quality of timber before cutting and the character of advance regeneration have been secured. The plan calls for a reexamination of the four levels of cutting at 5-year intervals to note changes in regeneration and growth of residual trees.

These areas, though small, are expected to be of value to the general public, forest landowners, timber operators, foresters and other visitors to the Kane Experimental Forest. In particular the staff of Allegheny National Forest could make use of this series of harvest cutting areas in connection with future Show-Me Trips. Here may be seen, compressed in a small area, the full range of stand treatments from no forestry to intensive forestry practice.

Harvest Cuttings--Growth on various amounts of residual growing stock

Another major job in the field of harvest cuttings was the 100 percent reinventory of 80 acres designed to show 10 year growth produced by various amounts of residual growing stock. This study was established in 1941 in cooperation with Allegheny National Forest. Four 20 acre blocks were laid out in a culled old growth stand mixed with second growth of black cherry, red maple, white ash and the birches. Complete tallies of all trees 14" dbh and larger were made in 1941 and 1951. Analysis of these continuous inventory data on each block and of the 1/5 acre sample plots within each are planned for the winter of 1951-52.

Harvest Cuttings--Selective cutting of old growth

By early September the field work on a 100 percent reinventory cruise of all trees 12 inches dbh and larger on 70 acres of old-growth on the Kane Experimental Forest was completed. The stand was then marked for a second selective cutting removing about 95 mbf (International 1/4" Rule) of poor risk trees. About one-half of the tract will be left with a high growing stock 10 or 11 mbf per acre to be cut on a 5 year cycle. The other half will also be cut on a 5-year cycle but the growing stock will be kept relatively low or between 4 and 5 mbf per acre.

All logs in all trees marked for cutting were graded to secure data for the timber appraisal. The grade of a sample of trees in the residual stand will be obtained after cutting in 1952. Analysis of the board foot and cubic foot growth records of the two portions of this stand for the period 1941-51 are in progress and will be reported on later.

PERSONNEL

Eldon M. Estep left the Station to join the Navy on September 7, 1951.

Verland Ohlson was employed as field assistant from August 15 to September 15, 1951. He returned to work with the Sale Area Betterment crew on Allegheny National Forest in September.

COOPERATION

Hough, Kinney and Stotz, examined several of the current timber sales in the northern district to determine the possibilities of securing black cherry regeneration by patch or strip cuttings. Existing strip cuttings were also visited. Kinney assisted in the timber appraisal for the cutting practice level blocks. The appraisal and sale supervision on the 70 acre old-growth selective cutting tract will be completed by District Ranger A. C. Van Nort and Assistant Ranger Orville E. Lind during the winter of 1951-52.

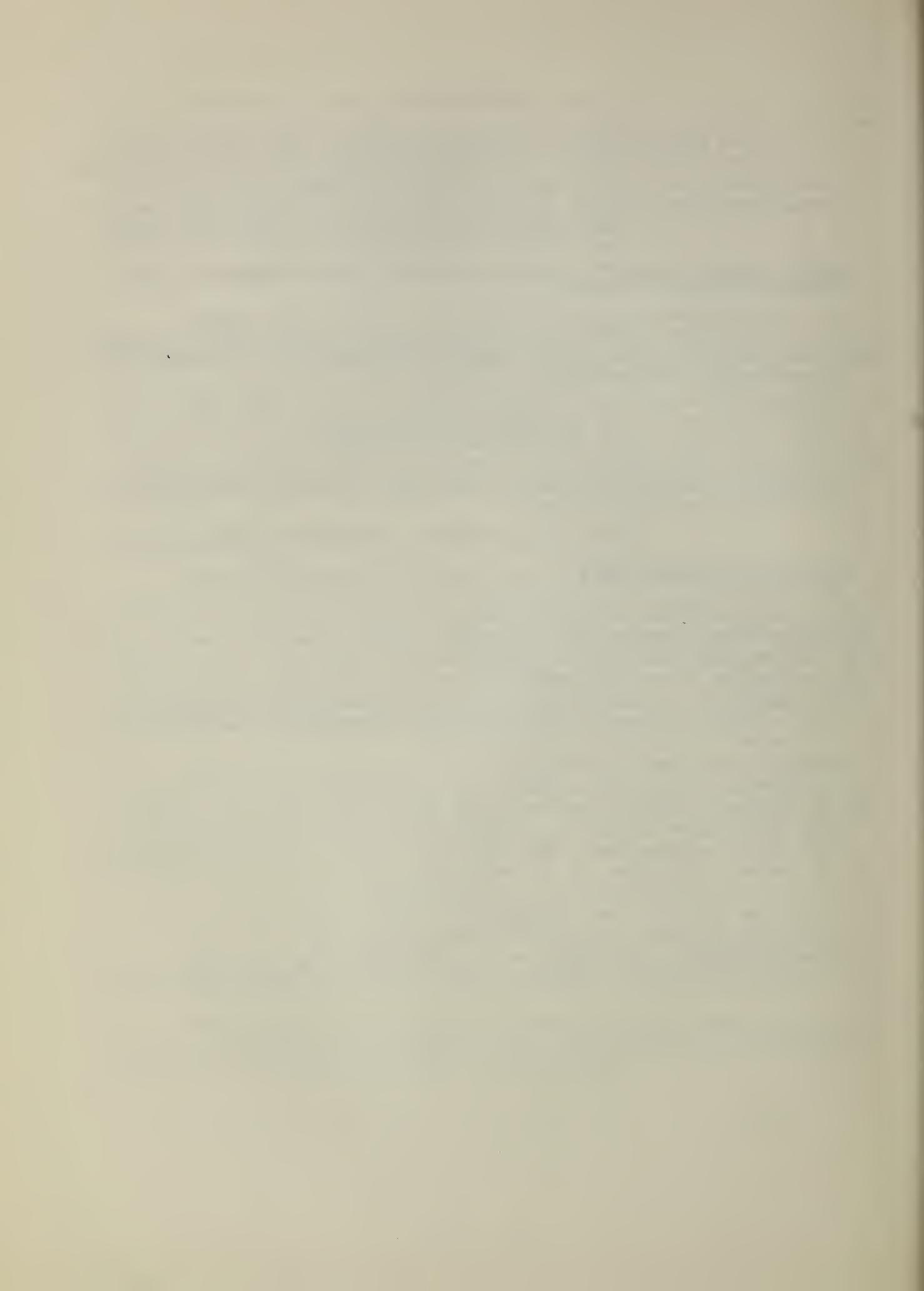
Dr. William Bramble and Mr. McCullough, a graduate student, spent several days on the Kane Forest examining the exclosures fenced 16 years ago against deer and rabbits.

VISITORS AND INSPECTIONS

A list of visitors follows. Sims and Bain made brief inspections of the Kane Experimental Forest

Visitors Field Season 1951

M. C. Howard, Kingston, Pa., June 18
Clifford Beck, Columbus, Ohio, June 29
I. H. Sims, Upper Darby, Pa., July 5-6
R. J. Costley, Warren, Pa., July 19
A. H. Anderson, Monongahela National Forest, Elkins, W. Va., July 19
G. P. B. Mullin, White Mt. National Forest, Laconia, N. H., July 19
R. J. Nelson, Philadelphia, Pa., July 19
L. P. Smith, Warren, Pa., July 19
C. L. Kinney, Warren, Pa., July 19
M. A. Mattoon, Philadelphia, Pa., July 19
Robert Bain, Upper Darby, Pa., July 23
A. L. Bennett, Johnsonburg, Pa., August--
C. A. Betts, Washington, D. C., August 22
A. C. Van Nort, Marienville, Pa., September 10
Dr. William Bramble, State College, Pa., Sept. 11-12
Mr. McCullough, State College, Pa., Sept. 11-12
L. R. Strickenberg, Philadelphia, Pa., September 13
F. H. Eyre, Minneapolis, Minnesota, Sept. 27-28 (at Upper Darby)



ANTHRACITE RESEARCH CENTER

Quarterly Report, July-September 1951

by M. C. Howard, W. E. McQuilkin and S. M. Filip

COMPARTMENT MANAGEMENT

Many compartments scheduled for cutting during the past year are being cleaned up and the last products marketed. This cleanup is found to be expensive and possibly our cost records will show an economic justification for the way many mine prop cutting areas are left. The job of cost summarization and analysis is ahead.

A Homelite one-man chain saw has been added to our logging equipment in our effort to increase production and reduce cost. Previously only two-man chain saws were available.

IMPROVEMENTS

A Quonset type office building was erected during the quarter. The inside finishing work is now underway.

A 145-foot well drilled to provide water for use around headquarters is ready for pump and water-line installations.

Abutments of salvaged creosoted railroad ties were constructed by the logging crew for the bridge near the weir site. The stringers have been cut and flooring bought locally to complete the bridge.

USDA FAMILY FARM POLICY REVIEW

At meetings of farmers and U. S. Department of Agriculture representatives in Luzerne, Monroe, and Wyoming counties, the discussion on forestry activities of the Department was led by forest officers from the Anthracite Center.

FOREST RESEARCH CORRELATION AND COOPERATION

As part of the national review and report on forest research correlation and cooperation among federal, state and private agencies the Anthracite Center assembled data from colleges and wildlife agencies. The research problems are many and every worker seems to be overextending his facilities in an effort to solve them.

SCRUB OAK CONVERSION

During the past quarter all of our experimental planting plots except those established in 1948 have been checked for survival, and release work has been done where called for in the working plans. The 1948 plots will be tallied this fall, and height growth data will be taken for the species that have survived and grown well enough to justify this extra attention.

1949 Plantings

As noted in last year's reports, frost heaving and deer damage was severe during the winter of 1949-50 on both the Bear Creek and Game Lands areas. Mean survival at Bear Creek in July, 1950, was 50 percent; on the Game Lands, it was 62 percent. These figures included damaged trees. Many of these, particularly those lying prostrate from heaving, can never fully recover.

The situation during the past year has undergone no great change. Tallies for 1951, recently made but not yet summarized, indicate additional mortality of perhaps 10 percent. Most of these losses doubtless were among the badly damaged trees. There has been little new heaving, and browsing last winter was relatively light. Many of the previously browsed seedlings are recovering remarkably well. Obviously, few trees are killed or irreparably injured by one browsing; it is repeated browsing that finally brings about their ruin.

In scrub oak or other highly competitive cover, a very significant secondary effect of deer browsing is the set-back in height growth, which results in overtopping and suppression of many trees that otherwise would come through without benefit of release cuttings.

Because of the heavy losses from frost and deer, the Bear Creek and Game Lands plantings are no longer of much value for the more refined comparisons originally planned. We still hope, however, to get enough trees past the deer to give some worth while comparisons of species performance on the two areas.

1950 Plantings

First-year survival on the 50-acre furrowed job was good for all species except red oak, as reported a year ago. Damage from frost heaving and deer has been negligible, and survival is good, ranging from 79 to 93 percent for the different coniferous species and mixtures. Present indications are that about 10 percent of the surviving trees will be overgrown and suppressed by brush from the sides of the furrows. This still leaves good prospects for establishment of a satisfactory stand.

Growth has been good. Many of the faster growing jack and pitch pines are already getting up above any threat of suppression by the scrub oak. Growth of the European larch is more variable, and the red pine

characteristically is slower growing for the first few years.

On the 2.5 acres where trees were interplanted in small openings in the scrub oak without site preparation, survival is now 68 percent for red pine and 86 percent for jack and pitch pines. However, some trees are being overgrown. Present estimates of trees that will come through without release are: red pine--40 percent; jack and pitch pines--60 percent of the number planted. Rapid initial height growth, as displayed by jack and pitch pines, is particularly important in such interplanting. We believe that, with good sized planting stock of fast-growing species, the method definitely has merit where the brush is relatively low and open.

On the two 1-acre plots treated with silvicides in 1949 and planted in 1950, survivals last year ranged from 65 to 89 percent for different species and mixtures. Recent examination shows that mortality during the past year has been negligible, but that there would eventually be considerable losses from overtopping by the brush. On the Weedone 32 plot (0.6 percent acid in oil), there was some top-kill of the brush, but it made rapid recovery in 1950. Inasmuch as the trees were planted without regard to proximity to oak crowns, more than half of them were being suppressed. On the Ammate plot (2 pounds per gallon of water), the brush was killed back, made little recovery in 1950, and is now only about 2 feet tall. Blueberry and other low growth mostly was killed. Consequently, the seedlings on this plot were in much better condition. Some, however, were being suppressed here also. In September, 1951, alternate rows in these plots were released in order to bring through a fair number of unsuppressed trees for growth comparisons with trees planted in furrows.

WHITE PINE UNDERPLANTING

From time to time we have reported upon an experimental planting of white pine made in 1948 on plots cut-over in the 1947 lagging study. Some of the planting plots were on a practically clear-cut area, some where about 65 percent of the volume had been removed from a 30-year-old oak stand. Initial survival was good, but the plots have been subjected to severe deer browsing every winter since their establishment.

In October, 1950, half of the plots were treated with Goodrite z.i.p. deer repellent. One application of the repellent as here applied was ineffective--treated plots were browsed as intensively as untreated ones.

Under the continued browsing, considerable mortality of seedlings has appeared during the last two years, and practically all seedlings are eaten back. Unable to make height growth, many are now being over-topped by oak sprouts and other brushy growth. Survival is down to 35 percent on the clear cut area, and 68 percent on the partially cut one. In view of this and the poor condition of the seedlings, the experiment has been terminated this year as a failure, the principal cause of which has been browsing by deer.

COASTAL OAK-PINE RESEARCH CENTER

Quarterly Report, July-September 1951

BELTSVILLE EXPERIMENTAL FOREST

by Malcolm J. Williamson

HYBRID POPLAR AND NURSERY WORK

It was necessary to cultivate the sapling test plantations, nursery plantings and pilot plantations twice, once in July and once in August.

Root rot developed in a conifer seedling bed where a layer of sawdust was used as a seed bed. Fortunately, the root rot injury was detected before any serious damage to the seedlings occurred. The infected bed was treated with a water solution of Fermate. The treatment arrested the disease with a resulting inappreciable loss of seedlings.

Several hundred hybrid poplar seedlings were planted in the nursery in July and August. These were brought here from the Morris Arboretum where the hybridization was done.

Height measurements were taken on poplars in clonal test plantations established in 1948 at the Berberich place and at the Administrative site. The tallest tree was 28 feet. The height measurement data from these clonal test plantations was subject to an analysis of variance to test the significance of differences between clones. As was expected, there was a highly significant difference between clones. A further analysis using the "t" test proved that site was also a significant factor affecting the growth of hybrid poplars.

Fire lines were maintained or established where necessary around hybrid plantations (maple, beech, oak, ash and pine) and around all of the poplar plantings.

Several man days were spent weeding ash, maple and yellow poplar nursery beds where mineral spirits could not be used.

COMPARTMENT MANAGEMENT STUDIES

The boundaries of compartments 40 and 45 were located and established. Both compartments were inventoried and marked for cutting. The cutting in the two compartments will remove all the merchantable trees

on narrow alternate strips. The uncut strips will be thinned to stimulate seed production of the remaining trees. The merchantable trees on the uncut strips will be harvested two to five years after the initial cut, leaving 4 or 5 pine seed trees per acre to provide a seed source to fill in any blanks as may then exist in those strips.

METASEQUOIA PLANTINGS

Several small plantings of Dawn redwood (*Metasequoia glyptostroboides*) seedlings were made during the late spring of 1950. The trees were planted on several sites in the forest and in the nursery. All the trees were measured at the end of the 1951 growing season. The average height and 1951 growth of the trees on the various sites was:

SITE	Average Height (Inches)	Average 1951 Growth(inches)
River bottom - hardwood overstory	10.9	4.3
Sandy soil near brook	8.8	2.2
Sandy soil-beech overstory	9.9	3.8
Nursery	24.4	19.0

The trees planted in the nursery were cultivated and watered during dry weather. Undoubtedly, this accounts for the fact that the trees in the nursery grew faster than those in the forest. Rabbits seem to be the most serious enemy of the Metasequoia in this area. Out of a total of 43 trees planted, 27 were injured and 5 were killed by rabbits during the winter. It appears that Metasequoia should be planted on a moist site fairly free of competing vegetation and the seedlings protected from damage by rabbits.

MISCELLANEOUS

Construction work is still in progress on the headquarters fire protection system and refrigerated room. A reroofing job was completed on several of the buildings. Plans for building a small residence have been approved and it is hoped that construction will begin during the next quarter.

A Fitchburg portable wood chipper was received during the close of the quarter. Studies will be initiated to find out how this machine can be used to help further our forest management work. It is hoped that the machine will enable us to remove some of the low grade material from the forest economically.

Several of the local sawmill operators, pulpwood buyers and other users of forest products have been contacted to find out if they would be interested in cooperating with us in our compartment pilot operation studies in forest management.

Mr. Haynes, Region 7 radio technician, installed a radio in our Willys pick-up fire truck. This radio transmits and receives on the frequency used by the Agricultural Research Center. This gives us an effective radio communication system in our forest protection work.

Pen Broomall spent several days at the Hopkins Memorial Experimental Forest in July and again in August cultivating hybrid poplar plantings.

Williamson participated in several meetings of the ARC Civilian Defense Committee to formulate a defense plan for the ARC. He also attended several meetings of the ARC Fire and Safety Board and the Maryland State Agricultural Mobilization Committee. In September Williamson took part in a fire training and equipment demonstration at Oakland, Maryland. Ford, Broomall and two representatives from the ARC attended the equipment demonstration to see some of the new developments in forest fire fighting equipment and observe their operation.

PERSONNEL

Dick Fenton joined our staff and is tackling the job of organizing a logging operation and marketing our forest products.

Our two forestry students, who have been helping us out during the summer, have returned to school, Rodney Mercker returning to Michigan State and Lloyd Swift, Jr. to Syracuse.

VISITORS

Professor of Silviculture Hans H. H. Heibers, Forester in charge of Forest Genetics Tallef Ruden, and Agronomist Arne Altern all of Norway were taken on a show-me trip of the forest.

LEBANON EXPERIMENTAL FOREST

Quarterly Report, July-September 1951

by S. Little

Administrative jobs required appreciable effort during the quarter. One was in preparing estimates on the extent of present and potential co-operation, as requested by the House Appropriations Committee. Another was participation in the family-farm review requested by the Secretary of Agriculture. This entailed the preparation of material for county meetings and attendance at some of the county and state meetings. Another job was the preparation of performance standards.

There were about 40 visitors during the quarter. The main group was a busload of school teachers on July 25. Individuals included Dr. J. E. Potzger and an assistant from Butler University, and L. G. MacNamara and an assistant from the Fish and Game Division of the New Jersey Department of Conservation and Economic Development. Mr. MacNamara was interested chiefly in the possible effects of prescribed burning on the habitat for deer.

Mount Misery Prescribe-burning Plots

Overwood and reproduction were retallied on the sample plots in the 80-acre Mount Misery prescribe-burning study. About 8 pines per acre were selected and marked as seed trees on the 40 acres of this study that are to be cut over this winter.

The retallies on the areas cut over in the winter of 1946-47 show relatively little change since 1948 in the amount of pine reproduction per acre, but great changes in its height. At the present time the number of small pines per acre on these areas is as follows:

Unburned before cutting	---	520
1 burn before cutting	---	1,175
2 burns before cutting	---	1,490
3 burns before cutting	---	1,980
4 burns before cutting	---	2,740
5 burns before cutting	---	4,100
10 burns before cutting	---	3,430

But of more importance than the increase in total number due to burning is the great increase in the number of relatively tall stems. At the present time the unburned controls have 100 pines per acre that are more than 3.5 feet tall, an increase of only 10 in the last 5 years. In contrast, the areas burned 10 times before cutting have 1,140 per acre, none of which were that tall in 1946. The other burning treatments tend to

fall within those two extremes.

On the areas not yet cut over the amount of pine reproduction now present differs from that present on the areas cut over after the burning treatments had been made for 10 years. Then the greatest amount of advance reproduction was found on the most frequently burned areas, those burned biennially or annually. Now, 15 years after the start of the study, the greatest amount of advance reproduction, about 1,600 pines per acre, is found in the areas burned at 4 or 5-year intervals. These areas have received 3 or 4 burns, apparently sufficient to prepare a favorable seedbed, and the last burn was 2 or 4 years ago so that there has been time for reproduction to become established without subsequent damage.

Eastern Shore Studies

The Maryland Department of Forests and Parks sold the timber in the summer-burning experimental area on July 7. The estimated 343,000 bd. ft. of pine and hardwoods brought \$11,001.99, or about \$32 a thousand. The scheduled treatments with machinery were made before cutting by Department personnel. On Sept. 10 the two plots scheduled to be burned after cutting were so treated by personnel of that Department with Little's help.

Exterior lines of two potential study areas were surveyed. One is a 42-acre tract of mature timber where the use of prescribed burns in the winter will be tested. The other is a possible site for cutting-practice-level plots. Computations of the resulting survey data have been completed.

Summer-burning Tests in New Jersey

Early in September some summer burning was tried on pine-swamp sites in southern New Jersey. These sites are difficult chances to burn with light fires, because the dense understories of sheeplaurel, leatherleaf, and other shrubs burn so intensely. However, pine stands should be grown on these sites, and at least one wild fire that burned during the summer gave very favorable results in favoring the establishment of an adequate number of pine seedlings. Consequently, when one owner wanted to heavily cut some stands on such sites and had not previously done any burning, it was decided to try the use of summer fires since a good seed crop matures this fall. Four tracts containing a total of about 120 acres were burned there during early September. Most of the burning crew was from the Department of Conservation and Economic Development with a minor amount of help from the SCS and Station.

These three agencies are planning to conduct a cooperative survey of the treated areas next summer. At that time it should be possible to determine the effects of burning compared to no treatment, and also the effects from fires of different intensities in providing favorable conditions for the establishment of pine seedlings on those sites.

MOUNTAIN STATE RESEARCH CENTER

Quarterly Report, July-September 1951

by Sidney Weitzman

CULL TREE REMOVAL

With the completion of cutting in the bulk management compartments, we were faced with the removal of a large number of cull trees. No information was available whether this could be done more effectively and economically by girdling or poisoning. It was decided to divide Compartments 25 and 26 into two sections each and to poison trees in one section of the compartments and girdle the trees in the other sections. This would accomplish the objectives of the cull removal and at the same time give us useful information to apply in all future compartments. The work was done late in July and during August.

In the poisoning, cups were made at the base of each tree using two cups for 6" trees and one additional cup for each additional two inches in diameter. Two tablespoons full of Ammate salt were placed in each cup cut in beech, hickory, maple and white oak. One tablespoon full of poison was placed in each cup cut in all other species. The methods and poison used were in accordance with the best information available. One month after the job had been completed, many of the poisoned trees had either lost all of their leaves or they were partially turned brown.

Girdling was done by two methods--half the girdled trees were girdled by the single hack method and the other half girdled by the double hack method in which chips were removed in a ring around the tree. Since girdling is the only method used in this State for cull removal, comparative data on costs and effectiveness would be most useful. On the trees girdled by either method, there appeared to be little observable change in the crown condition.

The costs of each method are given in tables I, II and III.

The work has been done too recently to assess the effectiveness of either method. It would appear, however, that if one wished to get rid of trees quickly, poisoning is the method to use. In choosing between the two methods of girdling, it appears that the only item to be considered is the cost which is approximately 1¢ more per tree for those girdled by the double hack method. However, since girdling must be well done in order to be effective, the double hack is probably the better one to use where there is any question of the quality of work done by the laborer.

TABLE I
POISONING COSTS

Size of Tree (D.B.H.)	Poisoning Time (Minutes)	Cost of Poisoning per tree (@ 90¢ per hour)	Cost of Poisoning @ .215 per lb. (per tree)	Total Cost of Poisoning tree (plus unproductive and lost time) 1/ per hour	Cost of Poisoning per tree (plus unproductive and lost time) 1/ per hour	No. of Poisoned Trees
6	1.2	.018	.028	.05	.12	10
8	1.8	.027	.042	.07	.14	9
10	2.4	.036	.056	.09	.16	8
12	3.0	.045	.070	.12	.19	8
14	3.6	.054	.084	.14	.21	7
16	4.2	.063	.098	.16	.23	7
18	4.8	.072	.112	.18	.25	6
20	5.4	.081	.126	.21	.28	6
22	6.0	.090	.140	.23	.30	6
24	6.6	.099	.154	.25	.32	5
26	7.2	.108	.168	.28	.35	5
28	7.8	.117	.182	.30	.37	5
30	8.4	.126	.196	.32	.39	4

1/ Unproductive and lost time was computed to be approximately 5 minutes or 7¢ per tree.

Table II
GIRDLING COSTS BY THE DOUBLE HACK METHOD

Size of tree (D.B.H.)	Girdling Time (Minutes)	Actual cost of girdling at 90¢/hour	Total cost of girdling plus unproductive and lost time ^{1/}	No. trees girdled per hour
6	1.0	.015	.06	15
8	1.4	.021	.07	14
10	1.7	.026	.07	13
12	2.1	.032	.08	12
14	2.5	.038	.08	11
16	2.8	.042	.09	10
18	3.2	.048	.09	10
20	3.6	.054	.10	9
22	4.0	.060	.10	9
24	4.4	.066	.11	8
26	4.7	.070	.12	8
28	5.1	.076	.12	7
30	5.5	.082	.13	7

^{1/} Unproductive and lost time was computed to be approximately 3 minutes or 4½¢ per tree.

Table III
GIRDLING COSTS BY THE SINGLE HACK METHOD

Size of tree (D.B.H.)	Girdling time (minutes)	Actual cost of girdling (at 90¢/hour)	Total cost of girdling plus unproductive and lost time ^{1/}	No. trees girdled per hour
6	0.7	.105	.05	16
8	1.0	.015	.06	15
10	1.3	.020	.06	14
12	1.6	.024	.07	13
14	1.8	.027	.07	12
16	2.2	.033	.08	12
18	2.4	.036	.08	11
20	2.7	.040	.08	10
22	3.0	.045	.09	10
24	3.3	.050	.10	10 .
26	3.6	.054	.10	9
28	3.8	.057	.10	9
30	4.1	.062	.11	8

^{1/} Unproductive and lost time was computed to be approximately 3 minutes or $4\frac{1}{2}$ ¢ per tree.

Observations will be continued to determine the effectiveness of all methods over a period of time.

COMPARTMENT MANAGEMENT STUDIES

Cutting in the bulk management compartments 25, 26 and 27 has just been completed. Cultural work is under-way. All roads have had water bars installed and should be in good condition until the next cut.

Work was started on the sawtimber management compartments. Compartment 16, designated as the "Good" cutting practice compartment is the first to be cut in this series.

In the area close to the road the old mechanical loaders used by the original loggers apparently took down every living thing in the area. As a result we have a stand of even-aged yellow poplar, black cherry, basswood and red oak as well as a scattering of other species. Farther up the slope there are quite a few residual sugar maples and hickories. Near the ridge of the compartment, there are old over-mature yellow-birch and some scattered spruce, which could not be reached in the original logging operation because of the rough ground.

It is expected that this sub-compartment will be cut over within five weeks and that the whole compartment (approximately 90 acres) will be cut over around the first of the year.

VISITORS

Foreign Visitors

Mucahit (Mike) Saylan, Member General Director of Forestry of the Ministry of Agriculture of Turkey.

Jose E. Burgos L., Horticulturist from Peru.

Erik Holmsgaard, Research Assistant in Forestry of the Royal Veterinary and Agricultural College at Copenhagen, Denmark.

Fred Post, a forester from Switzerland, with a Master of Science degree from Zurich Polytechnic Institute.

Austrain delegation: fourteen agricultural officials from Austria.

MEETINGS

Sidney Weitzman and G. R. Trimble, Jr. attended a four-day meeting of the Soil Science Association of America which was held at Pennsylvania State College, August 27-31. The annual meeting of the Northeastern Soil Group is scheduled to be held in Elkins next year.

The Advisory Committee to the Mountain State Research Center held its annual meeting at Parsons on September 26 and 27. All committee members and ten extra visitors were in attendance. Technical reports were presented by Sidney Weitzman, Carl J. Holcomb and G. R. Trimble, Jr. on the first day of the meeting. On the second day Carl Barr led a show-me trip of the logging operation in Compartment 16-A. Sidney Weitzman then led a tour of the mine timber compartments and presented some of the results of our cutting studies. The field meeting was concluded by a trip through the water management compartments led by Dick Trimble. Meals were served at Flossie's Main Street Restaurant and the meeting concluded there on Thursday afternoon with a short business session.

PAPERS

Sidney Weitzman presented a paper on "Management of Mountain Hardwoods for the Production of Sawtimber and Minetimber" at a meeting of the Society of American Foresters.

Sidney Weitzman presented a paper on "Surveys and Investigations of Watersheds as a Preliminary to Placing Watersheds under Management" at the meeting of the West Virginia Chapter of the Soil Conservation Society of America.

SHOW-ME TRIPS

A group of 19 students from the New York College of Forestry, Syracuse, N. Y., concluded a 3,000 mile tour of forests and forest operations in eastern United States by a show-me trip on the Fernow Experimental Forest. The group was under the leadership of Dr. D. P. White.

INSPECTIONS

Dr. Marquis and Ivan H. Sims made an inspection of the Mountain State Research Center the last week in July. Mr. Sims spent the whole week with us making an inspection of our compartment management work both in the field and in the office. Dr. Marquis arrived during the middle of the week and spent three days with us going over our installations and our work plans.

NORTHERN HARDWOOD RESEARCH CENTER

Quarterly Report, July-September 1951

by Northern Hardwoods Staff

PILOT OPERATION STUDY

Hauling products from last year's operation on the patch cutting compartment was completed. In addition to the hardwood veneer logs used, the cooperator sold pulpwood, beech bolts for pegwood (shoe pegs), 10,000 board feet, spruce and hemlock for sawlogs, and white ash for handle stock. Almost 95% of the pulp was hardwood, a few cords of spruce and fir, and the remainder hemlock. The following summarizes the cut on the two patch compartments:

Logs	69,110 bd. ft.
Four-foot wood	283.17 cords
Waste (stumpage paid)	24.00 cords

The use of the Blodgett Rule rather than the International proved advantageous from our standpoint as there was a $3\frac{1}{2}\%$ over-run.

The initial inventory or marking of the two compartments scheduled to be cut this logging season was completed during this quarter. Each compartment is about 70 acres in size. Both are all-aged, to be cut selectively under High Order cutting practices on a 10-year cutting cycle. The two compartments differ only in the growing stock level objective. In the case of one compartment (27), a low growing stock of 60 square feet; the other compartment (29) high with a 100-foot goal. Before cutting, growing stock averaged about 120 square feet basal area per acre including trees 5" d.b.h. class and above.

The growing stock goal will not be attained in either compartment in making the first cut. In order not to open up the stand too drastically, a little more than 30 square feet of merchantable material will be removed in the initial cut on Compartment 27. An additional 20 square feet have been marked for later girdling or poisoning. Trees marked for girdling or poisoning are, in most cases, optional insofar as the operator is concerned. Supposedly less than half the gross volume of these trees is merchantable for pulpwood or other products. A high ratio of optional trees, particularly in the more accessible locations, is being cut by the operator. In some locations where the removal would unduly open up the stand, the trees will be girdled or poisoned, even though the operator would be agreeable to taking them out. The growing stock reserve will be approximately 70 square feet. The next cut ten years hence will be made up of the excess 10 square feet plus growth.

The high mortality of beech due to the nectria canker following beech scale, made it necessary to salvage or presalvage the heavily infected trees. This was not a serious matter on the low growing stock compartment except that it made for some irregularity in the stands. However, in Compartment 29, with a growing stock goal of 100 square feet, it is a more serious matter. In addition to poor risk beech, practically all the paper birch on Compartment 29 has reached its maturity as indicated by the fact that it had a negative growth of 20% in the last 12 years. In salvaging the nectria infected beech, cutting the mature paper birch, and disposing of poor quality trees, some of which are a liability, the growing stock will be somewhat reduced below 100 square feet per acre. This will mean that in subsequent operations, less than periodic growth will be removed in order to build up the volume to the desired level.

In addition to the two pilot operation compartments, the cutting practice level plots were marked for cutting. These will be cut shortly.

Logging operations by the sub-contractor of our cooperator got under way after Labor Day. Weather permitting, the season's operations including hauling will be completed during the last quarter of this year. Approximately one-half of Compartment 27 was cut in September. Two tractors are used in skidding material tree length to the landing. The stems are bucked and the products sorted on the landing. Softwood logs are being sold to sawmills, ash for handle stock, and small birch for boltwood. Hardwoods of suitable size and quality are cut for a low grade of veneer logs. Logs cut from large trees dead for several years are acceptable for veneer providing only the sapwood is rotten. The remainder of the merchantable material goes into pulpwood.

Cultural Work

Cultural work following last winter's cutting on Compartments 5 and 6 was completed during the quarter. These compartments were cut in patches. The area of patches clearcut totaled about 20 acres. Unmerchantable stems were eliminated within the patch cut areas to provide optimum conditions for the development of paper birch, yellow birch and white ash in the new stand.

Within the patches, saplings down to 2" (3" for softwoods) in diameter were cut with the axe and bucksaw. Most of the trees from about 5" in diameter and up were poisoned with a 50% Ammate solution applied in tangential holes spaced four inches apart around the circumference of the trees. The holes were bored with a King Tree Tapping Machine. The work was done during July and August.

Some trees were poisoned using a 34% solution of Ammate and some with a 19% solution in order to obtain a rough idea of the possibilities of these weaker solutions. After casual observation the 34% solution appears to be as effective in killing the trees as the 50% solution. Both

were successful although some trees poisoned with each seem to be quite resistant to the poison. The 19% solution could not as yet be called satisfactory although some trees were killed by it. The effect of the three solutions on stump sprouting will be checked next spring.

Spraying to control beech scale was undertaken on the uncut areas of High Order Compartment 5. About 550 beech trees were sprayed. The best available information indicates that if the beech scale population on the lower bole of a tree is kept to a minimum the Nectria will not attack the tree which should then survive the current epidemic.

The trees sprayed included all the Grade 1 and 2 beech on the compartment that were not too far gone to save as well as some of the best trees down to 8" in diameter and some of the larger pulpwood quality trees. Roughly 11 trees per acre were treated.

The treatment was the application of a DDT solution (33 milliliters of 34% DDT solution in a gallon of water) to the bark of the tree from ground level to a height of about 10 feet. The solution was applied with a knapsack sprayer using a two-man crew. One man sprayed while the other kept him supplied with solution and scouted the trees which had been previously marked for spraying.

PAPER BIRCH SEEDBED STUDY

In September, a small-scale experiment was set up to determine the relative value of three different types of seedbed preparations of the germination and growth of paper birch. The area selected for this experiment is located in a 70-year old second growth Paper Birch-Red Maple-Aspen stand that had been cut over for paper birch boltwood during the winter of 1944-45. This removal of the better quality paper birch resulted in a number of irregular openings in the crown canopy, ranging in size from a few square feet to about 0.1 acre.

A total of 12 milacre plots, each 6.6' x 6.6', were established in one of the larger openings. Surrounding this opening are a number of mature paper birch trees ranging in size from 5" to 9" d.b.h. Thus the plots should be literally showered with seeds this fall. All the small trees and underbrush were removed from the area to reduce the effects of competition and shade to a minimum.

The following treatments were made:

1. Removal of the litter by raking.
2. Exposure of the mineral soil by removing the litter and humus.
3. A light burn which consumed most of the leaf litter.

Each treatment was given to three plots selected at random. The remaining three were left untreated and set aside as check plots. An isolation strip 1.65 feet wide was left around each plot and subjected to the same type of treatment.

The plots will be examined next summer at which time the number of paper birch seedlings on each plot will be recorded. Observations will also be made in the following years to determine the period of effective paper birch reproduction following a disturbance to the site.

PAPER BIRCH REPRODUCTION STUDY

Russell Hutnik spent the last week in August in Maine studying the reproduction of paper birch. The trip was very successful primarily because of the excellent cooperation furnished by the Maine Forest Service. He and Mr. R. W. Nash of the Maine Forest Service spent several days together in the field visiting recent commercial logging operations in the Oxford County region which is probably the best paper birch area in America. They examined the reproduction becoming established on the recently cutover areas, paying special attention to paper birch reproduction. They also visited the seeding and planting experiments being carried on by the Maine Forest Service in the township of Norway. These experiments are concerned with the seeding and planting of old fields with paper birch under a number of different treatments of the sod and soil.

In addition, he spent a day at the Massabesic Experimental Forest comparing the paper birch reproduction that became established following the fires of October 1947. Although some areas supported very dense stands of paper birch seedlings, other areas were almost entirely void of reproduction. This would seem to indicate that the severity of the fire strongly influenced the amount of reproduction secured, a very hot fire being especially unfavorable.

PHILLIPS BROOK BUDWORM STUDY AREA

The second tally of blowdown and wind breakage losses on the study area was made in September; the end of the third year since cutting was completed. The tally was made on the established cruise plots as was the tally made in 1950. The cruise plots account for more than 6% of the area.

Average volume loss for the period is 1.3% per year. Of the number of trees over 3.5" d.b.h., 1.6% were lost. The average diameter of the trees lost was 8.9" compared to an average diameter of 6.2" in the stand after cutting.

Although there were two severe windstorms in the winter of 1949-50 and another in the fall of 1950, there appears to be no great loss corresponding to any of these storms. At any rate, the average monthly loss for the periods 1949-50, 1950-51, and 1949-51 was the same. The table below gives some additional information:

Phillips Brook Budworm Area
Summary of Wind Damage*
(Per Acre)
1948-1951

Residual Stand
September, 1948

No. Trees Cords

353.8 20.47
Ave. d.b.h. = 6.2 inches

Total Wind Damage to September 1951
Percent Loss

No. Trees Cords No. Trees Cords

5.8 .81 1.6 4.0

Ave. d.b.h. = 8.9 inches Ave. loss per
mo. = .0225 cords

Damage by Periods

September 1948 - July 1950
No. Trees Cords

3.4 .49

Ave. d.b.h. = 8.9 inches
Ave. loss per mo. = .0225 cords
Lost on 338 acres = 165.47 cords
Salvaged = 0

July 1950 - September 1951
No. Trees Cords

2.4 .32

Ave. d.b.h. = 8.8 inches
Ave. loss per mo. = .0225 cords
Lost on 338 acres = 108.06 cords
Salvaged = 38.83 cords

*Per acre figures including all spruce and fir 3.6" d.b.h. and larger.
Total acreage of the study area is 338 acres.

PERSONNEL

Russel J. Hutnik returned to the Yale Forest School to complete work for his Master's Degree.

There were quite a few changes in the field assistant group - Dick Cole transferred to the Navy Yard at Portsmouth, N. H.; Karl Schanda returned to the New Hampshire Forest School for his senior year; Eugene Keenen transferred from the Massabesic to Bartlett.

Christine Wilson, all six pounds, is the most recent addition to the official family.

VISITORS

In addition to official visitors, singletons, and small groups, there were several sizeable groups who visited the Bartlett Forest. These included the Society of American Foresters, Division of Education group; Ted Childs' staff from Norwich, Conn.; N. H. Forest School summer camp students; Northeastern Forest Pest Control Committee; and foresters of the New Hampshire-Vermont division of the St. Regis Paper Company.

HOPKINS MEMORIAL EXPERIMENTAL FOREST

Quarterly Report, July-September 1951

by F. E. Cunningham

GENETICS

The Hybrid Poplar Plantations, established on the forest this past spring, and described in our previous report, received two additional cultivations during the summer, spaced at approximately 1 month intervals. Weeds proved to be quite a problem this year. In addition to the mechanical cultivation mentioned, it was necessary to resort to hand weeding between the second and third cultivation to control them. Bindweed proved to be particularly noxious. This plant, often spread by a cultivator from one small patch to over a relatively large area seriously handicaps the growth and development of the planted trees. As yet, no real or effective control has been found other than grubbing it out by hand.

This fall scheduled observations on mortality, disease, and insect attacks and height growth measurements were started. To date, all of the 1950 and 1951 plantations have been completed. The 1949 plantations, now having completed their third growing season, are yet to be completed. Because of the height of many of the trees, it is difficult to determine their height with a measuring pole, the leaves obscure the figures on the measuring pole at its upper limits. By waiting until after the leaves fall, we believe that this task will be much easier. In all, we now have a total of some 29,786 individual trees on which we keep periodic measurement records.

The data from these measurements is now being summarized. To date this work has progressed to the point where some information on certain aspects of the poplar research program is available.

Earlier reports have contained frequent mention of the difficulty that we have been experiencing with controlling weeds and sod during the first growing season. Each year it is necessary to cultivate at least three times and, to be really effective, probably four should be made. For some time now, we have been searching for some method of weed control which might permit the elimination of cultivation. An effective weed control program should do two things: (1) It should not inhibit the growth of the poplars and (2) It should effectively control the weeds and grass which do inhibit the poplar growth. To date we have investigated two possible approaches to this problem on a very small scale:

1. Use of Cover Crops: In the spring of 1950, five poplar clones were planted with 8 different cover crops to determine their effect on the growth of these five clones and to observe their effect on weed development. In addition, a control planting of these same five clones was made in plowed land and these were kept cultivated during the first season in our usual manner. This made a total of 9 treatments in all, each of which was replicated twice.

At the end of this, the second growing season, the height growth of the poplars in the cultivated or control treatment was almost twice that attained on any of the cover crop plots. In addition, their effect on weed development during the first growing season was almost negligible. Results obtained indicate that the cover crop plants used in this study were of little value in controlling weeds and had a detrimental effect on the growth of the hybrid poplars when compared with the growth attained by the same clones when kept under cultivation during the first season. The data from this study has been compiled and is shown in Table I below:

TABLE I
AVERAGE HEIGHT AT END OF SECOND GROWING SEASON

Cover Crop Treat.	OP-46	OP-51	OP-206	OP-333	OP-334	Av. of all Clones
Lupine	2.31	2.63	2.96	2.34	2.37	2.52
Wheat	2.52	2.10	3.40	2.06	2.25	2.47
Lotus	2.47	3.19	3.95	2.22	2.15	2.80
Brome	1.85	1.18	2.74	1.75	2.08	2.03
Buckwheat	2.61	2.56	2.58	2.04	2.64	2.49
Millet	1.60	1.96	2.23	1.86	2.01	1.93
Lespedeza	1.81	2.49	3.48	2.74	2.68	2.64
Soybean	2.59	2.20	3.02	2.39	2.49	2.54
Average All Treat.	2.2	2.36	3.04	2.18	2.33	2.43
Control						
Cultivated	4.82	5.71	5.38	5.08	5.26	5.25
Av. all Plots	2.51	2.73	3.30	2.50	2.66	2.74

While it is obvious from the above table that the cover crop plants used, inhibit the growth of the poplars to too great an extent to be considered further, it is interesting to note that when the cover crops are ranked according to average height attained by the clones in a descending sequence, brome and millet rank near the bottom in every instance while Lotus, soybean and lespedeza rank near the top in nearly every instance. Table II illustrates observation.

TABLE II

RANK OF COVER CROP TREATMENT ACCORDING TO AVERAGE HEIGHT
(Descending Order)

Rank		OP-46	OP-51	OP-206	OP-333	OP-334	All clones
Av. Height							
1	Crop	2.61 Buckwheat	3.19 Lotus	3.95 Lotus	2.74 Lespedeza	2.68 Lespedeza	2.80 Lotus
Av. Height							
2	Crop	2.59 Soybean	2.63 Lupine	3.48 Lespedeza	2.39 Soybean	2.64 Buckwheat	2.64 Lespedeza
Av. Height							
3	Crop	2.52 Wheat	2.56 Buckwheat	3.40 Wheat	2.34 Lupine	2.49 Soybean	2.54 Soybean
Av. Height							
4	Crop	2.47 Lotus	2.49 Lespedeza	3.02 Soybean	2.22 Lotus	2.37 Lupine	2.52 Lupine
Av. Height							
5	Crop	2.31 Lupine	2.20 Soybean	2.96 Lupine	2.06 Wheat	2.25 Wheat	2.49 Buckwheat
Av. Height							
6	Crop	1.85 Brome	2.10 Wheat	2.74 Brome	2.04 Buckwheat	2.15 Lotus	2.47 Wheat
Av. Height							
7	Crop	1.81 Lespedeza	1.96 Millet	2.58 Buckwheat	1.86 Millet	2.08 Brome	2.03 Brome
Av. Height							
8	Crop	1.60 Millet	1.73 Brome	2.23 Millet	1.75 Brome	2.01 Millet	1.73 Millet

2. Use of Sawdust Mulch: A small informal study was established this spring to explore the possibility of using a sawdust mulch to retard weed development and to observe its effect on the growth of the poplars. Toward this end, four clones were selected for use, OP-52, OP-229, OP-255, and OP-256. Using 4 tree plots, one of each of the above listed clones in each plot, one of three treatments was assigned to each plot. The three treatments were as follows: Sawdust mulch at the rate of 1 even bushel per tree. Sawdust mulch as described but with 0.35 lbs. of

ammonium nitrate fertilizer applied in a ring around the planted tree and about 1 inch away from it following the application of the sawdust. The third treatment was a control, neither mulch nor fertilizer was used. One set of plots was located in a freshly plowed strip which received no further attention or treatment after the trees were planted and the mulch and fertilizer treatments applied. A second set was located on an old fire lane which had been cleared of all vegetative cover with a bulldozer down to heavy clay soil two years ago and on which little or no vegetation had returned since. Most of the organic material had been removed in the preparation of the fire lane. Prior to planting a disc harrow had been run over it a few times to loosen the surface for planting. At each location each treatment had been replicated seven times at random. Thus, at each location we had 21 4-tree plots, 7 of which had been mulched with sawdust, seven mulched and fertilized and seven with no treatment at all. Observations of this fall showed the following results:

1. Mulching did tend to reduce weed cover, except for goldenrod which seemed to thrive, tho with less density than on untreated plots.
2. It seemed to hold back the growth of the poplars planted in it. Nowhere was growth as vigorous as could be expected on cultivated sites.
3. When fertilizer was added, mortality seemed to increase, especially on those plots located on the old fireline.

Table III shows the percent survival and Table IV shows the Average Height attained on the plots in this study.

In Table IV it will be noted that the average growth for all clones, and all treatments was superior in the plowed strips to that in the old Fire lane. This would be expected because of the better site and higher fertility level in the plowed strip.

While no check planting was made in plowed land which was subsequently cultivated in this year's plantings, two of the clones in Table IV were included in the Sapling Clonal Test Plantings of this year which were accorded cultivation after planting. In four replicates, the average height of Clone 229 was 2.76' and that of Clone 255 was 2.48'. This is much greater than that shown for these same clones in the table.

IMPROVEMENTS

Equipment Depot

During the period, the interior of the new apartment was painted, linoleum laid in the kitchen, bathroom and connecting hallway, the heating plant has been completed. With still some minor work to be done, the apartment is now ready for occupancy.

TABLE III
PERCENT SURVIVAL ON MULCH AND FERTILIZER PLOTS
(At end of first growing season)

Treatment	Location	OP - 52	OP-229	OP-255	OP-256	All Clones
Control	Fire Lane	85.7%	100.0	100.0	100.0	96.4
	Plowed Strip	100.0	100.0	85.7	100.0	96.4
	Average	92.8	100.0	92.8	100.0	96.4
Mulch	Fire Lane	100.0	100.0	100.0	100.0	100.0
	Plowed Strip	85.7	85.7	100.0	100.0	92.9
	Average	92.8	92.8	100.0	100.0	96.4
Mulch &	Fire Lane	42.8	14.3	0.0	14.3	17.8
Fertilize	Plowed Strip	85.7	100.0	85.7	100.0	92.9
	Average	64.3	57.1	42.8	57.1	55.3
All Treatments	Fire Lane	76.2	71.4	66.7	71.4	71.4
	Plowed Strip	90.5	95.2	90.5	100.0	94.0
	Average	83.3	83.3	78.6	85.7	82.7

TABLE IV
AVERAGE HEIGHT OF TREES ON MULCH AND FERTILIZER PLOTS
(End of first growing season)

Treatment	Location	OP - 52	OP-229	OP-255	OP-256	All Clones
Control	Fire Lane	0.77	0.94	0.60	0.66	0.74
	Plowed Strip	1.43	0.81	1.55	1.66	1.36
	Average	1.10	0.87	1.07	1.16	1.05
Mulch	Fire Lane	0.57	0.49	0.51	0.74	0.58
	Plowed Strip	1.72	1.38	1.30	1.50	1.47
	Average	1.14	0.93	0.91	1.12	1.02
Mulch &	Fire Lane	0.67	1.00	--	0.60	0.72
Fertilize	Plowed Strip	2.83	1.19	1.48	1.63	1.75
	Average	1.75	1.09	0.74	1.11	1.23
All Treatments	Fire Lane	0.66	0.73	0.56	0.69	0.66
	Plowed Strip	1.96	1.11	1.36	1.59	1.62
	Average	1.31	0.92	0.96	1.14	1.09

On the exterior, the west foundation wall has been repaired and the retaining wall which protects the entrance to the cellar on the south side of the building has been restored. A small entrance porch has been erected on the south side of the building and the grounds on the south and west side have been rough graded to provide adequate drainage from the

building and to prevent subsequent damage from water to the foundation walls.

Barn

The three overhead doors have now been installed in the barn making all of the space in the barn now available for use. In addition, a small parking space has been constructed in the space between the barn and the residence-office building.

MISCELLANEOUS

During the last two weeks in August, the forest was closed to permit the resident to take some well earned leave.

Cunningham, who has been appointed as the Forest Service representative on the Massachusetts Agricultural Mobilization Committee, was kept busy for a few days with the activities of this committee.

A two-day meeting of the New England Section of the SAF at Great Barrington, Massachusetts provided an excellent opportunity for us to meet many of the Station Staff again and to meet Dr. Marquis for the first time.

In the closing days of the quarter, we all received a scare one evening, when we saw clouds of smoke billowing up on the horizon. Investigation proved it to be a farmer burning old stacks of hay. We helped him put them out and obtained his promise to notify us in the future when he planned to burn.

Visitors to Hopkins during the period included Bob Bain, Ernie Schreiner, Jonathan Wright, Vic Jensen, who were concerned with various administrative and research tasks.

PENO BSCOT RESEARCH CENTER

Quarterly Report, July-September 1951

by A. C. Hart

EXPERIMENTAL FOREST

Construction

A considerable amount of time was spent during the quarter on various construction projects on the experimental forest. The major project was clearing and leveling the right of way for four miles of additional access road that bisects the forest and joins the shore of Chemo Pond at two points. This was an unusually wet summer, which made bulldozing through low areas difficult. In spite of unfavorable conditions the work of clearing and rough grading the four miles was done in 82 machine hours by a D-7 tractor with bulldozer. Nearly two and a half miles of the new road are passable by truck during the summer, and the entire four miles can serve as a winter road if the usual frost penetration occurs. Approximately in the middle of the experimental forest is a swamp, 16 chains wide at the narrowest place. This "great dismal" is our biggest obstacle insofar as road building is concerned. Unlike other swampy areas on the forest, this one does not have a solid clay bottom near the surface. Present plans are to fill the right of way across the swamp with slash and corduroy, and cover this with gravel as funds become available.

As the road clearing progressed, several water holes were dug for fire protection purposes. In an attempt to locate gravel deposits, the bulldozer operator investigated several knolls along the way. Three places showed a thin stratum of gravel ranging in thickness from 6 inches to 2 feet, grading into a hard substratum of mixed rock and clay. However, only one gravel deposit of any size was found, and even this probably will yield no more than 9,000 cubic yards.

Three additional culverts were installed, and more ditching was done on the gravel road built last year. This should take care of the places that tended to wash during the heavy rains of last fall and this spring.

About a mile of haul road was bulldozed in Compartment 3 with the D-7. We were a little reluctant to use such a big machine for this job, but by angling the blade to reduce the width of clearing, and by extreme care on the part of the operator, little damage was done to adjacent trees.

A 500-gallon gasoline tank with a Tokheim metered pump was installed at the site of the proposed oil house. The site was prepared for construction and the building will be completed this fall, serving as a storage place for paint and other inflammables as well as for oil.

The floor for the field office and workshop portion of the combination building was poured this quarter. Ready-mixed concrete was used, and the job was completed in one day.

Logging

Felling, limbing and peeling of the pulpwood on Compartment 3 has been finished. Cutting of about 3 M board feet of white pine logs and about $2\frac{1}{2}$ cords of white birch veneer bolts will be done while twitching progresses. Twitching will start about October first as a contract job. Compartment 3 marks the first chance of integrated logging on the experimental forest.

Wind Damage Following Partial Cutting

A check was made of wind and storm damage on two more spruce-fir experimental areas. These stands - 300 and 160 acres in size - were cut under the tree selection system in 1947. The purpose of the experiment was to study the effects of this method of cutting upon growth, change in stand structure, and resistance to damage from the spruce budworm. The salient data on losses during the first four years after cutting are as follows:

	Original stand per acre		Percent cut		Losses per acre			
	B. A.	Vol.			Trees	3.6" +	Vol.	5.6" +
	All sp.	Sp.-F.	B.A.	Vol.	Fir	Spr.	Fir	Spr.
	Sq.ft.	Cds.	%	%	No.	No.	Cds.	Cds.
Johnson Mt.	109	8.6	15	46	10.7	1.9	0.25	0.06
T 5, R 18	141	15.4	22	59	4.4	2.4	.23	.20

This information was obtained from 127 permanent fifth-acre plots. Further analyses are being carried out to determine whether degree of damage is associated with such factors as site, density of residual stand, and percent of cut. The over-all picture as shown above indicates that wind and storm losses need not be excessive following selection cutting. It is thought that after the first three or four years the residual stand becomes stabilized and wind losses become negligible thereafter.

by T. F. McLintock

Safety

A safety plan for the Penobscot Research Center was written this quarter. A poster was designed and constructed by Miss Goodine, showing the number of days and man hours worked without lost time accident. This is posted in the field office and is kept current each pay period.

Chief Watts Visits the Penobscot

The Penobscot Research Center was fortunate in having a short, but interesting, visit from Chief Watts in September. Accompanied by Director Marquis and Regional Forester Swingler, Mr. Watts made Bangor his first stop on a trip through northern New England.

Half a day was spent on the Penobscot Experimental Forest looking over the work that has been done since the Forest was established last year. In the afternoon Maine Forest Commissioner Nutting joined the group for an informal discussion. A report was given on the progress of Research Center work outside the experimental forest, and Mr. Nutting reviewed current state programs under the Clarke-McNary and Cooperative Forest Management projects.

During the evening the Chief, Director, and Regional Forester met with a group representing the pulp and paper industry, the Maine Forest Service and the Forestry Department of the University of Maine. In speaking to the group, Chief Watts expressed gratification at the improvement in forestry practices and fire protection that had occurred since his trip to Maine eight years ago.

Other Visitors

Lewis P. Bissell, Extension Forester for Maine, and two of the four recently-appointed service foresters - Elwin Macomber of Bangor and Edwin Niskanen of Island Falls - spent a day going over the work on the experimental forest with special reference to the CPL plot demonstration.

Bob Bain was with us several days on an administrative inspection trip, with one day devoted to the experimental forest. It was Bob's first visit to the Penobscot Research Center, and we enjoyed and profited by having him here.

Charles King of the International Paper Company, one of the nine cooperating companies, spent a day visiting the experimental forest.

A. P. Dean, Chief of the Division of Engineering in the Washington Office stopped at the experimental forest several hours while on a vacation trip. He was especially interested in road and building construction..

Harold Young of the University of Maine Forestry Department and Dr. V. F. Sokoloff of the Isaiah Bowman School of Geography at Johns Hopkins University spent half a day on the experimental forest examining soil profiles at half a dozen different sites.

Bob Collins and Gordon Mark of the Division of State and Private Forestry in the Regional Office were each here a day to discuss, respectively, the CM-2 program and the Cooperative Forest Management project in Maine.

Bob Heller and Jim Bean of the Bureau of Entomology and Plant Quarantine flew in and stayed long enough to take a complete set of aerial photos of the Penobscot Experimental Forest. The panchromatic films taken last year proved unsatisfactory for forest type delineation so the forest was "re-flown" using infra-red film.

WHITE PINE RESEARCH CENTER

Quarterly Report, July-September 1951

by the White Pine Research Center Staff

COMPARTMENT STUDIES

Major emphasis has again been placed on the Compartment Management Studies this quarter. Early approval of the amendment to the working plan provided us with the necessary green light to proceed with field work in conjunction with the revised plans.

As the plans now stand we have eleven compartments included in the study. These compartments encompass the following treatments.

<u>Treatment</u>	<u>Number of Compartments</u>
High-order cutting practices	
Shelterwood - quality	2
Patch - quality	2
Good cutting practices	
Shelterwood - quality	2
Patch - quality	2
Strip - quality	1
Fair cutting practices	
Diameter limit	1
Poor cutting practices	1

During this summer's field work we completed the 100 percent inventory on six of the compartments and in addition, have one compartment marked for treatment. Boundaries have been located, marked, and surveyed for all compartments.

TREE STUDIES

Work has been started on the construction of cubic foot volume tables for the Forest using Bickford's new method. Our findings to date indicate that the average butt class for white pine on the Forest is 0.867. Butt class for white pine in the Northeast, based on forest survey data, is 0.886. Using the "t" test we find that there is a significant difference between the butt class on the Forest and in the Northeast. Within the Forest, on areas differing in soil and site values, there do not appear to be any significant differences in the butt class.

Remeasurement of the trees in the growth study plots established in 1936 by the CCC has been completed.

SALVAGE OPERATIONS

Salvage of blow-down and dead standing timber was completed during October. Total cut in these operations amounted to almost a million board feet. The Massabesic logging crew cut 365,695 bd. ft., and 602,000 board feet was sold to individuals in stumpage sales.

OTHER ACTIVITIES

The Agricultural Mobilization Committee, on which Gedney is the Forest Service representative, has been very active during this period. The Committee made recommendations concerning the future agricultural program in this area and a county wide meeting was held in connection with the "Family Farm."

With the transfer of Eugene Keenen, student assistant, to the Experimental Forest at Bartlett, N. H., we closed the books on student employment for the summer.

McConkey and Gedney attended the Driver's Training School at Laconia, N. H. At the present time all personnel having driver's licenses have attended the school.

McConkey and Gedney also visited the Harvard Forest at Petersham, Mass. for two days. Dr. Raup, the director, arranged a very interesting and profitable show-me-trip.

Visitors during the quarter included two consulting foresters - Mr. Philip Coolidge from Bangor, Maine, and Mr. Bernard Chandler, from Washington, D. C.

Other visitors were Bob Dineen (in charge of the Service Forestry program for the State of Maine) and five new Service Foresters, Lou Bissel, State Extension Forester, and Steve Jacobs, forester for the New England Forestry Foundation.

We were pleased and honored to have Chief Lyle Watts pay us a visit on Friday, Sept. 28. He was accompanied by Dr. Marquis, Regional Forester Swingler, and Ken Butterfield of the White Mountain National Forest.

Sam Hutcheson is back with us now after his operation. He appears to be on the road to recovery and we are pleased that he is again part of our organization.

